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ABSTRACT

This secondary carpentry program is designed for grades 10, 11, and 12. Sophomores learn applicable trade procedures and practices, use of tools and materials, products, and devices common to the trade. Juniors receive work experience and a continuing theory program. Seniors are given advanced theory, cost estimation, materials listing, job requirement calculations, and more work experience. This curriculum guide includes general objectives, a curriculum outline, competencies, a student progress record, and 42 references. Twenty-one major areas are outlined: (1) introduction; (2) use and conditioning of hand tools; (3) portable power tools; (4) stationary machines; (5) fasteners; (6) millwork; (7) stagings; (8) concrete floors; (9) framing floors; (10) framing walls and partitions; (11) roof framing; (12) exterior flashing; (13) exterior roof covering; (14) exterior trim; (15) stairs; (16) insulation; (17) drywall construction; (18) interior trim--floor; (19) interior trim; (20) kitchen cabinets; and (21) customer relations and business practices. A separate apprentice-related carpentry curriculum is included. The carpentry trade and related training components each require a period of training of 8,000 hours. The apprentice document lists the following for each of 16 required courses: length of course; description; competencies; textbooks; and resources. (NLA)

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# CARPENTRY

# CURRICULUM

PREPARED BY EASTCONN
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PREPARED FOR:

CONNECTICUT STATE DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION
VOCATIONAL-TECHNICAL SCHOOL SYSTEM
MIDDLETOWN, CONNECTICUT

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TABLE OF CONTENTS

Program Description . . . . . 1

General Objectives . . . . . 1

Curriculum Outline by Major Area . . . . . 3

Competencies . . . . . 4

Curriculum Detail . . . . . 8

Student Progress Record . . . . . 33

Bibliography . . . . . 51

PROGRAM DESCRIPTION

The secondary level carpentry program is designed for Grades 10, 11 and 12. Grade 9 is used as an exploratory year. Fifty percent of the three-year program is shop time and 50 percent academic. By alternating trade cycles with related and general education, students spend a full 90 days per year in shop.

The 9th grade year is devoted to trade exploration, safety practices and general trade orientation. Sophomores learn applicable trade procedures and practices, use of tools and materials, products and devices common to the trade. Juniors receive extensive work experience with a continuing theory program. Seniors are given advanced theory, cost estimation, materials listing, job requirement calculations and more sophisticated work experience.

GENERAL OBJECTIVES

Student will be able to:

1. Employ safety practices in carpentry work.
2. Exercise good work habits and demonstrate their abilities to apply theory to practical experiences. These habits will include an emphasis on pride of workmanship.
3. Enter occupational areas in the Carpentry trade with basic skills, trade ethics, and pre-requisite knowledge for advanced apprentice standing.

GRADE 10

Student will be able to:

1. Demonstrate sound safety practices.
2. Identify and use hand tools with proper care and safety.
3. Perform basic operations and jobs with hand tools.
4. Demonstrate skills in performing basic operations on stationary power machines.
5. Demonstrate basic skills with portable power tools.
6. Identify and use common fasteners.
7. Lay out and build cabinets.
8. Demonstrate readiness, basic knowledge, and skills for production work.

GRADE 11

Students will be able to:

1. Demonstrate sound safety practices.
2. Lay out foundations and forms according to state and local building codes.
3. Erect staging properly and safely.
4. Identify and install all residential structural members.
5. Demonstrate basic framing knowledge and skills.
6. Use various methods of installing insulating materials.

GRADE 12

Student will be able to:

1. Demonstrate sound safety practices.
2. Perform basic operations in roof framing.
3. Lay out and erect wall partitions using metal as well as wood components.
4. Lay out and apply roofing materials.
5. Demonstrate experiences with exterior trim and common sidings.
6. Apply drywall material.
7. Install interior trim.
8. Lay out and construct stairs.

CURRICULUM OUTLINE BY MAJOR AREA

I. INTRODUCTION

II. USE AND CONDITIONING OF HAND TOOLS

III. PORTABLE POWER TOOLS

IV. STATIONARY MACHINES

V. FASTENERS

VI. MILLWORK

VII. STAGINGS

VIII. CONCRETE FORMS

IX. FRAMING FLOORS

X. FRAMING WALLS AND PARTITIONS

XI. ROOF FRAMING

XII. EXTERIOR FLASHING

XIII. EXTERIOR ROOF COVERING

XIV. EXTERIOR TRIM

XV. STAIRS

XVI. INSULATION

XVII. DRYWALL CONSTRUCTION

XVIII. INTERIOR TRIM-FLOORING

XIX. INTERIOR TRIM

XX. KITCHEN CABINETS

XXI. CUSTOMER RELATIONS AND BUSINESS PRACTICES

COMPETENCIES

I. Foundations

A. Establish Building Lines
B. Erect Wall Footing Forms
C. Erect Pier and Column Forms
D. Erect Slab Type Forms
E. Erect Foundation Wall Forms
F. Erect Retaining Wall Forms
G. Erect Forms for Steps
H. Strip Wall Forms
I. Wall Preparation
J. Horizontal Shoring
K. Single Post Shoring

II. Framing

A. Plumb Post and Studs
B. Frame Girders
C. Frame Sill
D. Install Steel Columns
E. Nail Up Joist Hangers
F. Frame Stair Openings
G. Frame Chimney Openings
H. Frame Fireplace Openings
I. Frame Utility Openings
J. Frame Joists
K. Nail Up Woodbridging, Cross and Solid
L. Nail Up Steel Bridging
M. Install Fire Stops
N. Frame Decks
O. Balloon Frame
P. Platform Frame
Q. Frame Bearing Partition
R. Frame Non-Bearing Partitions
S. Frame Metal Wall Partitions
T. Frame Window Openings
U. Frame Door Openings
V. Nail Up Exterior Wall Sheathing
W. Install Sub-Flooring

III. Stair Building

A. Lay out Open Stairs
B. Lay out Closed Stairs
C. Lay out Platforms
D. Build Open Stairs
E. Build Closed Stairs
F. Build Platform

IV. Roof Framing

A. Lay out Roof
B. Frame Gable Roof
C. Lay out Intersecting Roofs
D. Frame Intersecting Roofs
E. Lay out Hip Roof
F. Frame Hip Roof
G. Lay out Trusses
H. Frame Trusses

V. Roofing

A. Apply Composition Shingles
B. Apply Wood Shingles
C. Apply Asphalt Shingles
D. Apply Roll Roofing

VI. Exterior Flashings

A. Install Step and Continuous Flashing
B. Flash Around Chimney
C. Flash Hips and Valleys
D. Flash Around Dormers
E. Flash Around Doors and Windows

VII. Exterior Trim

A. Install Window Frames
B. Install Door Frames
C. Install Garage Door Frames
D. Install Corner Boards
E. Install Wood Shingles
F. Install Drop Siding
G. Install Clapboards
H. Install Tongue and Groove Siding
I. Install Board and Batten
J. Install Plywood Siding
K. Install Composition Siding
L. Install Metal Siding
M. Install Plastic Siding
N. Install Shake Shingles
O. Install Open Cornice
P. Install Closed Cornice
Q. Hang Wood Gutters
R. Hang Metal Gutters
S. Install Facia
T. Install Soffits
U. Install Rake Board

VIII. Interior Trim

A. Install Finish Floorings
B. Trim Cased Openings
C. Install Window Trim
D. Install Base Boards
E. Trim Closets
F. Install Door Jambs
G. Fit and Hang Doors
H. Install Sliding and Folding Door
I. Install pre-hung Doors
J. Install Finished Hardware
K. Install Ceiling Tile
L. Hang Suspended Ceiling
M. Install Ceiling Mouldings

IX. Kitchen Cabinets

A. Lay Out Base Unit
B. Lay Out Wall Unit
C. Lay Out Counters
D. Apply Plastic Laminates
E. Install Base Units
F. Install Wall Units
G. Install Counters

X. Fasteners

A. Use Nails
B. Apply Adhesives
C. Assemble with Screws
D. Assemble with Bolts
E. Install Anchors

XI. Dry Wall

A. Install Ceilings
B. Apply to Walls
C. Install Corner Beads
D. Taping
E. Mouldings

XII. Insulation

A. Install Blankets
B. Install Batts
C. Apply Loose Insulation
D. Install Building Boards

XIII. Portable Power Tools

A. Route/Shapes
B. Trim Veneer
C. Plane Surfaces
D. Sand Surfaces
E. Cut to Lines
F. Cut Irregular Shapes
G. Staple
H. Drill Holes
I. Use Fastening Devices

XIV. Stationary Machines

A. Perform Plane Surfaces Operations
B. Perform Jointer Operations
C. Saw to Lines
D. Perform Radial Saw Operations
E. Perform Panel Saw Operations
F. Perform Band Saw Operations
G. Perform Scroll Saw Operations
H. Perform Mortiser Operations
I. Perform Horizontal Borer Operations
J. Perform Lathe Operations
K. Perform Shaper Operations
L. Perform Tool Grinder Operations
M. Perform Drill Press Operations
N. Perform Belt and Disc Sander Operations
O. Perform Miter Box Operations

XV. Stagings

A. Assemble Tubular Sections
B. Install Planking
C. Install Safety Devices
D. Apply Pump Jacks
E. Erect Single and Double Pole
F. Mount Wall Brackets
G. Mount Roof Brackets

CURRICULUM OUTLINE

I. INTRODUCTION

A. Orientation
   1. Brief history of carpentry
   2. Opportunities for advancement
B. Job Opportunities
   1. Independent job shops
   2. Self-employed business
   3. Firms that specialize
   4. Union
C. Salaries and Wages
   1. Trainee
   2. Skilled tradesman
   3. Specialist
   4. Officials or executives
D. Today's Trends
   1. Energy conservation
   2. Increase in carpentry applications
   3. New materials and techniques
   4. Job application
E. General Shop Safety
   1. Eye protection
   2. Moving parts guard
   3. Clothing and hair
   4. Cutters and grinding wheels
   5. Safe work scaffolding practices
   6. Safe electrical practices

II. USE AND CONDITIONING OF HAND TOOLS

A. Safety
B. The Level
   1. Safety
   2. Types and uses
   3. Check for level
   4. Check for plumb
   5. Adjust vials
C. The Plumb Bob
   1. Safety
   2. Check for plumb
   3. Check for center
   4. Replace line
D. The Builders' Level
   1. Safety
   2. Types and uses
   3. Set up tripod
   4. Attach level and scope
   5. Adjust level and scope
   6. Use plumb bob

E. The Chalk Line
   1. Safety
   2. Chalk line
   3. Tighten line
   4. Snap line
   5. Replace line

F. Steel Square
   1. Safety
   2. Square
   3. Use of tablets
      a. graduation
      b. board measure
      c. octagon scale
      d. rafter scale
      e. brace scale

G. Scribers and Dividers
   1. Safety
   2. Lay Out equal spaces
   3. Lay Out rounded corners
   4. Scribe irregular surfaces

H. Hatchets
   1. Safety
   2. Types and uses
   3. Shingling
   4. Point a stake
   5. Hue to rough work
   6. Hue to a line
   7. Condition and repair

I. Boring Tools
   1. Safety
   2. Types and uses
   3. Lay Out centers
   4. Bore holes
   5. Countersink
   6. Counterbore
   7. Condition
   8. Expansion bits
   9. Bit brace
   10. Hand drill

J. Hand Saws
   1. Safety
   2. Types and uses
   3. Cut to length
   4. Rip to line
   5. Cope
   6. Cut curves
   7. Cut holes
   8. Condition

K. Chisels
   1. Safety
   2. Types and uses
   3. Pare
   4. Gain
   5. Cut with grain
   6. Cut against grain
   7. Cut curves
   8. Condition

L. Filing Tools
   1. Safety
   2. Types and uses
   3. File and rasp
   4. Rough
   5. Smooth
   6. Replace handles

M. Scrapers
   1. Safety
   2. Types and uses
   3. Cut rough
   4. Cut smooth
   5. Cut at angle
   6. Condition

N. Nail Pullers and Wrecking Bars
   1. Safety
   2. Types and uses
   3. Pull nails
   4. Pry
   5. Condition

O. Pliers
   1. Safety
   2. Types and uses
   3. Cut
   4. Twist
   5. Tighten
   6. Condition

P. Sharpening Stones
   1. Safety
   2. Types and uses
   3. Rough
   4. Hone
   5. Condition

Q. Clamps
   1. Safety
   2. Hold
   3. Use when gluing

R. Hammers
   1. Safety
   2. Types and uses
   3. Nailing

S. Wood Finishing
   1. Safety
   2. Abrasives
   3. Finishers

III. PORTABLE POWER TOOLS

A Safety
B. Routers
    1. Safety
    2. Install bit and collet
    3. Adjust for cut
    4. Trim edges
        a. square
        b. bevel
        c. curve
    5. Maintain
C. Veneer Trimmers
    1. Safety
    2. Install bit and collet
    3. Adjust for cut
    4. Trim edges
        a. square
        b. bevel
        c. curve
    5. Maintain
D. Electric Planes
    1. Safety
    2. Adjust plane for cut
    3. Cut with grain
    4. Cut against grain
    5. Assemble and install cutter
    6. Cut right angles
    7. Cut bevels
    8. Method of feed
    9. Grind and stone cutters
    10. Maintain
E. Belt Sanders
    1. Safety
    2. Remove and replace belts
    3. Sand
    4. Maintain
F. Oscillating Sanders
    1. Safety
    2. Remove and replace sandpaper
    3. Sand
    4. Maintain
G. Circular Saws
    1. Safety
    2. Install and remove blades
    3. Adjust for depth of cut
    4. Rip with fence
    5. Rip without fence
    6. Cross cut
    7. Use jigs
    8. Maintain

H. Saber Saw
   1. Safety
   2. Install and remove blades
   3. Rip
   4. Cross cut
   5. Plunge cut
   6. Curve cut
   7. Maintain

I. Reciprocating Saws
   1. Safety
   2. Install and remove blades
   3. Cut straight or curved openings
   4. Plunge cut
   5. Flush cut
   6. Maintain

J. Staplers
   1. Safety
   2. Types and uses
   3. Load stapler
   4. Staple light material
   5. Staple heavy material
   6. Maintain

K. Hammers
   1. Safety
   2. Types and uses
   3. Load hammer
   4. Nail light material
   5. Nail heavy material
   6. Nail special material
   7. Maintain

L. Drills
   1. Safety
   2. Types and uses
   3. Start
   4. Stop
   5. Install bits
   6. Lay Out holes
   7. Bore holes
   8. Automatic screw driver
   9. Maintain

M. Power Actuated Drivers
   1. Safety
   2. Load cartridge
   3. Load drive pin
   4. Fire driver
   5. Remove cartridge
   6. Use guards
   7. Maintain

IV. STATIONARY MACHINES

A. Safety
B. Surface Planers
    1. Safety
    2. Check thickness of stock to be planed
    3. Adjust planer to reduce stock to desired thickness
    4. Maintain
C. Jointers
    1. Safety
    2. Adjust machine depth of cut fence
    3. Joint stock - direction of grain
    4. Joint stock - feed
    5. Cut chamfers and bevels
    6. Rabbet
    7. Maintain
D. Table Saws
    1. Safety
    2. Rip stock
    3. Cut off stock
    4. Cut dados
    5. Rabbeting
    6. Rip on angle
    7. Cut off angles
    8. Cut tennons
    9. Cut tapers
    10. Cut fingerjoints
    11. Cut coves
    12. Use accessories
    13. Maintain
E. Radial Saws
    1. Safety
    2. Cut stock to rough length
    3. Square ends
    4. Rip stock to width
    5. Rip angles
    6. Cut off angles
    7. Rabbet
    8. Dado
    9. Feed
        a. use accessories
        b. use jigs
    10. Maintain
F. Panel Saws
    1. Safety
    2. Rip
    3. Cut off
    4. Feed
    5. Maintain

G. Band Saws
   1. Safety
   2. Install blades
   3. Adjust machine
   4. Cut with grain
   5. Cut against grain
   6. Cut curve
   7. Use of jigs
   8. Maintain

H. Scroll or Jig Saws
   1. Safety
   2. Install and adjust blades
   3. External and internal cutting
   4. Bevel or angle cutting
   5. Coping
   6. Use of jigs and accessories
   7. Maintain

I. Mortisers
   1. Safety
   2. Install and adjust bits and chisels
   3. Adjust machine for cuts
   4. Cut mortisers
   5. Feed
   6. Maintain

J. Horizontal Borers
   1. Safety
   2. Install and adjust bits
   3. Adjust machine
   4. Single hole boring
   5. Twin hole boring
   6. Maintain

K. Lathes
   1. Safety
   2. Wood training tools
   3. Turn between centers
   4. Turn of face plate
   5. Cut
   6. Sand
   7. Finish
   8. Bore
   9. Use jig and templates
   10. Maintain

L. Shapers
   1. Safety
   2. Cutter types
   3. Install cutters
   4. Adjust machine
   5. Feed
   6. Cut with and against grain
   7. Cut curve work
   8. Edge
   9. Rabbet
   10. Cut tennons
   11. Cut dados
   12. Cut mouldings
   13. Cope
   14. Use jigs
   15. Maintain

M. Tool Grinders
   1. Safety
   2. Coarse grind
   3. Finish grind
   4. Grind flat
   5. Grind bevels
   6. Dress wheels
   7. Maintain

N. Drill Press
   1. Safety
   2. Install cutters
   3. Adjust speed
   4. Straight and compound angle cuts
   5. Use of jigs
   6. Maintain

O. Belt and Disc Sanders
   1. Safety
   2. Install and remove belts or disc
   3. Rough cut
   4. Finish cut
   5. Sand new work
   6. Sand old Work
   7. Maintain

V. FASTENERS

A. Safety
B. Nails
    1. Safety
    2. Types and uses
C. Adhesives
    1. Safety
    2. Types and uses
D. Wood Screws
    1. Safety
    2. Types and uses
E. Bolts
    1. Safety
    2. Types and uses
F. Anchors
    1. Safety
    2. Types and uses
G. Miscellaneous Fasteners
    1. Safety
    2. Types and uses

VI. MILLWORK

A. Safety
B. Projects
    1. Safety
    2. Blind dado joint
    3. Open divetail joint
    4. Half lap dovetail joint
    5. Splined miter joint
    6. Finger joint
    7. Flat panel door
    8. Raised panel door
    9. Book case
    10. Wardrobe with drawers
    11. Lawn furniture
    12. Cabinets

VII. STAGINGS

A. Safety
   1. Scaffold should be constructed and/or erected under the direction of an experienced craftsperson
   2. Follow design specifications as listed in local and state codes
   3. Inspect scaffolds daily before use
   4. Provide adequate pads or sills under scaffold post
   5. Plumb and level scaffold members as the erection proceeds
   6. Equip planked areas with proper guard rails and toe boards when required
   7. Power lines near scaffold are dangerous consult power service for advice and procedures
   8. Do not use ladders or makeshift devices on top of scaffold to increase the height
   9. Be certain the planking is heavy enough to carry the load and span
   10. Planking should be extended at least six inches beyond all supports
   11. Do not permit planking to extend an unsafe distance beyond supports
   12. Remove all materials and equipment from the platform of rolling scaffolds before moving
   13. Height of platform on rolling scaffolds should not exceed by four times the smallest base dimension

B. Build Single Pole and Double Pole Spacings
   1. Safety
   2. Establish height and spacings
   3. Erect poles and ledgers
   4. Install bracing
   5. Plank and cleat
   6. Install guard rails
   7. Maintain

C. Wall Brackets (Steel)
   1. Safety
   2. Lay out and bore holes
   3. Install brackets
   4. Place and secure interior cleat
   5. Secure bracket
   6. Plank and cleat
   7. Maintain

D. Roof Brackets
   1. Safety
   2. Lay Out spacing for first set
   3. Install first set
   4. Plank
   5. Install additional sets

E. Pump Jacks
   1. Safety
   2. Install jacks on poles
   3. Space and erect poles
   4. Secure top braces
   5. Raise and lower jacks
   6. Plank
   7. Install necessary lower bracing
   8. Maintain

F. Ladders
   1. Safety
   2. Carry ladder
   3. Foot ladder
   4. Raise ladder
   5. Secure ladder
   6. Ascent and descent
   7. Lower ladder
   8. Maintain

VIII. CONCRETE FORMS

A. Foundation Wall Forms
   1. Safety
   2. Lay out wall lines on footing
   3. Install
      a. outer form
      b. bucks and utility openings
      c. wall ties
      d. whalers (outside and inside)
      e. inner form
   4. Secure wall ties
   5. Square and plumb corners
   6. Align tops
   7. Brace form
   8. Establish pouring line
   9. Build necessary runways
   10. Maintain

B. Erect Retaining Wall Forms
   1. Safety
   2. Lay out wall lines on footing
   3. Install one sided
      a. square plumb and align
      b. install bracing
      c. establish pouring line
   4. Install two sided
      a. square plumb and align
      b. install bracing
      c. establish pouring line.

C. Build Forms For Steps
   1. Safety
   2. Lay out and cut stringers and risers
      a. sloping ground
      b. between walls
      c. open steps

3. Install
    a. stringers
    b. risers
    c. necessary braces

D. Strip Footing Forms
    1. Safety
    2. Remove
        a. braces
        b. spreaders
        c. inner form
        d. outer form

E. Horizontal Shoring Beams For Reinforced Concrete Forms
    1. Erect beams on ledgers or in designated notchers
        a. lock in place
        b. inspect
    2. Install stringers and sheathing
        a. avoid shock loads or uneven loading on erected formwork
    3. release and strip shoring beams only when engineer certifies concrete strength.

F. Single Post Shoring
    1. Erect single post shoring from ledger to sill
        a. footing to be solid
        b. never exceed shoring heights recommended by manufacturer
        c. use appropriate plates or U-Nepos and fasten to ledger and sill
        d. brace diagonally from ledger to sill
        e. inspect
    2. Release and strip only when engineer certifies strength is adequate

G. Strip Wall Forms
    1. Safety
    2. Remove braces
    3. Remove whalers
    4. Remove inner and outer forms
    5. Remove opening forms
    6. Remove snap ties
    7. Clean and prepare for re-use

H. Foundation Wall Preparation
    1. Remove snap ties
    2. Parge holes
    3. Waterproofing
    4. Insulate
    5. Bracing
    6. Backfill

IX. FRAMING FLOORS

A. Safety
B. Building Girders
   1. Safety
   2. Lay out and frame flush/drop girder
   3. Lay out and prepare solid girder wood/steel
   4. Install girder with temporary supports
   5. Crown, straighten, and brace girder
C. Install Lally Column
   1. Safety
   2. Lay out
   3. Place upper & lower plates into position
   4. Place column in position
   5. Plumb column
   6. Remove temporary support
D. Install Sills
   1. Safety
   2. Select materials
   3. Lay out sills
   4. Square and align
   5. Snap guide lines
   6. Apply sill sealer or grout
   7. Apply and fasten
E. Install Joist Hangers
   1. Safety
   2. Types
   3. Lay out
   4. Fasten hangers
F. Frame Stair Openings
   1. Safety
   2. Lay out opening
   3. Lay out trimmers
   4. Lay out and cut headers
   5. Lay out and cut tail joist
   6. Install parts
G. Frame Chimney Openings
   1. Safety
   2. Lay out opening
   3. Lay out trimmers
   4. Lay out and cut headers
   5. Lay out and cut tail joist
   6. Install parts
H. Frame Fireplace Openings
   1. Safety
   2. Lay out opening
   3. Lay out trimmers
   4. Lay out and cut headers
   5. Lay out and cut tail joists
   6. Install parts

I. Frame Utility Openings
   1. Safety
   2. Lay out opening
   3. Lay out trimmers
   4. Lay out and cut headers
   5. Lay out and cut tail joist
   6. Install parts

J. Install Joists
   1. Safety
   2. Select materials
   3. Square ends
   4. Cut to length
   5. Crown
   6. Fasten joists
   7. Straighten and tie
   8. Install fire stops

K. Wood Bridging
   1. Safety
   2. Type
   3. Layout
   4. Cut
   5. Install

L. Steel Bridging
   1. Safety
   2. Type
   3. Lay out
   4. Install

M. Install Sub Flooring
   1. Safety
   2. Select materials
   3. Lay out first course
   4. Cut and place
   5. Nailing

N. Install Fire Stops
   1. Safety
   2. Types
   3. Balloon framing
   4. Platform framing

X. FRAMING WALLS AND PARTITIONS

A. Safety

B. Erect Balloon Frame
   1. Safety
   2. Lay out ribbon
   3. Lay out and cut studs
   4. Assemble corner studs
   5. Assemble and erect walls .
   6. Plumb, straighten and brace walls
   7. Install plates

C. Erect Platform Frame - Exterior Wall
    1. Safety
    2. Lay out shoe and top plate
    3. Lay out and cut studs
    4. Assemble corner posts and channels
    5. Assemble wall
    6. Straighten, square and apply sheathing
    7. Erect walls and brace
D. Erect Bearing and Non-Bearing Partition
    1. Safety
    2. Lay out shoe and top plate
    3. Lay out and cut studs
    4. Assemble and erect partition
    5. Plumb, straighten and brace
    6. Double top plate
    7. Install necessary backing
    8. Plumb and fasten to channels
E. Lay Out and Erect Metal Partition
    1. Safety
    2. Use of special tools
    3. Use of fasteners
    4. Lay out and install runners
        a. floor
        b. ceiling
        c. walls
    5. Space and install studs
    6. Locate and install brackets for utility
    7. Accommodate plumbing and heating requirement
    8. Frame door and other openings
F. Frame Window Openings
    1. Safety
    2. Lay out
    3. Cut and install
        a. headers
        b. jacks
        c. sub-sill
        d. cripples
    4. Assemble
G. Frame Door Openings
    1. Safety
    2. Lay out
        a. exterior
        b. interior
    3. Cut
        a. headers
        b. jacks
        c. cripples
    4. Assemble

H. Frame Utility Openings
    1. Safety
    2. Openings For
        a. pipes
        b. medicine cabinet
        c. ducts
        d. fans
        e. miscellaneous
I. Apply Exterior Wall Sheathing
    1. Safety
    2. Cut and install board
    3. Tongue and groove square edge
    4. Cut and install sheets
        a. plywood
        b. composition

XI. ROOF FRAMING

A. Safety
B. Type-Gable
    1. Safety
    2. Lay out and cut
        a. ridge
        b. common rafter
        c. gable studs
    3. Erect and fasten
        a. ridge
        b. common rafters
        c. gable studs
C. Type-Hip
    1. Safety
    2. Lay out and cut and install
        a. ridge
        b. common rafters
        c. hip rafters
        d. jack rafters
D. Type-Intersecting Gable Roof
    1. Safety
    2. Lay out, cut and install
        a. ridges
        b. common rafters
        c. valley rafters
        d. jack rafters
E. Type-Trusses
    1. Safety
    2. Lay out
    3. Build jigs and templates
    4. Cut framing members
    5. Assemble with
        a. plates
        b. bolts
        c. connectors

XII. EXTERIOR FLASHING

A. Safety
B. Step and Continuous
    1. Safety
    2. Cut step flashing
    3. Bend step flashing
    4. Install step flashing
    5. Bend continuous flashing
    6. Install continuous flashing
C. Chimney Flashing
    1. Safety
    2. Install apron
    3. Install flashing
    4. Cut, shape and secure counter flashing
    5. Build saddle
    6. Flash saddle
D. Hip and Valley Flashing
    1. Safety
    2. Cut and install hip flashing, step
    3. Cut and install valley flashing, step
    4. Cut and install valley flashing, continuous
E. Dormers
    1. Safety
    2. Install apron
    3. Install window pan
    4. Install valley flashing
    5. Install step flashing
F. Door and Window Flashing
    1. Safety
    2. Install drip cap
    3. Install pan flashing

XIII. EXTERIOR ROOF COVERING

A. Safety
B. Composition Shingles
    1. Safety
    2. Type
        a. strip
        b. interlocking
        c. individual
    3. Application
        a. install drip edge, wood shingles
        b. install drip edge, metal
        c. apply building paper (if called for)
        d. lay out and apply starter course
        e. apply additional courses
        f. apply caps

C. Wood Shingle Application
   1. Safety
   2. Establish spacing
   3. Install starter course
   4. Break joints
   5. Apply on roof laths
   6. Apply on solid surface
   7. Apply on hips
   8. Apply on ridge
   9. Apply on valley
   10. Apply caps

XIV. EXTERIOR TRIM

A. Safety
B. Window Frame and Sash Installation
   1. Safety
   2. Check rough opening
   3. Install building paper
   4. Insert frame in opening
   5. Level sill
   6. Plumb side jamb
   7. Fasten
   8. Shim sill
C. Door Frame Installation
   1. Safety
   2. Check rough opening
   3. Install building paper
   4. Insert frame in opening
   5. Level sill
   6. Plumb side jamb
   7. Fasten frame
D. Clapboards
   1. Safety
   2. Install corner boards
   3. Establish spacing
   4. Apply starter course
   5. Meter or butt corners
   6. Snap lines
   7. Apply additional courses
   8. Apply flashing
E. Tongue and Groove Vertical Siding
   1. Safety
   2. Establish spacing
   3. Install first board
   4. Cut, fit and install additional boards
   5. Nail, face and toe

F. Board and Batten Application
   1. Safety
   2. Establish spacing
   3. Install first board
   4. Install additional boards
   5. Install battens
G. Plywood Application
   1. Safety
   2. Install first sheet
   3. Install additional sheets
H. Composition Siding Application
   1. Safety
   2. Establish spacing
   3. Install starter strip
   4. Install door window and caps
   5. Install corners
   6. Install special trim strips
I. Metal Siding Application
   1. Safety
   2. Proper insulated backer
   3. Establish starting line
   4. Install corners
   5. Install starter strip
   6. Install door/window accessaries
   7. Install special trim
   8. Install siding
J. Plastic Siding Application
   1. Safety
   2. Proper insulated backer
   3. Establish starting line
   4. Install corners
   5. Install starter strip
   6. Install door/window accessaries
   7. Install special trim
   8. Install siding
K. Open Cornice
   1. Safety
   2. Cut rafter tails
   3. Block between rafters
   4. Install sub facia
   5. Install facia
   6. Install mouldings
   7. Install rake boards

L. Closed Cornice
   1. Safety
   2. Cut rafter tails
   3. Install sub facia
   4. Install lookout blocks
   5. Install plancier/soffit
   6. Install facia
   7. Install frieze
   8. Build return
   9. Install mouldings
   10. Flash return
   11. Install rake board

M. Wood Gutter Installation
   1. Safety
   2. Lay out pitch
   3. Cut and install
   4. Seal joints
   5. Build return
   6. Establish location of outlets
   7. Bore hole for outlets
   8. Install outlets
   9. Install downspout

N. Metal Gutter Installation
   1. Safety
   2. Lay out pitch
   3. Install hanger
   4. Establish location for outlets
   5. Cut holes for outlets
   6. Install outlets
   7. Cap ends
   8. Seal-joints, ends, and outlets
   9. Install gutter
   10. Join sections
   11. Install down spouts

XV. STAIRS

A. Safety
B. Open Stairs, Lay Out and Install
   1. Safety
   2. Carriages
   3. Risers
   4. Threads
   5. Skirts
   6. Newell posts
   7. Rails
   8. Balusters
   9. Returns
   10. Mouldings

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C. Closed Stairs, Lay Out and Install
   1. Safety
   2. Housed stringer
   3. Risers
   4. Threads
   5. Mouldings
   6. Rails

D. Platform Stairs, Lay Out and Install
   1. Safety
   2. Platform
   3. Carriages
   4. Risers
   5. Threads
   6. Newel posts
   7. Rails
   8. Balusters
   9. Mouldings

XVI. INSULATION

A. Safety
B. Types
   1. Install blanket
   2. Install batt type insulation
   3. Install loose type insulation
   4. Install insulating building board

XVII. DRY WALL CONSTRUCTION

A. Safety
B. Ceilings
   1. Safety
   2. Lay out spacings
   3. Install furring
   4. Establish starting point
   5. Cut material
   6. Fastener types & uses
   7. Break joints
   8. Cut holes for outlets

C. Walls
   1. Safety
   2. Lay out and install necessary blocking
   3. Cut and install vertical
   4. Cut and install horizontal
   5. Cut holes for utility openings
   6. Install corner beads

XVIII. INTERIOR TRIM-FLOORING

A. Apply End Match Tongue and Groove
   1. Safety
   2. Fastener types and uses
   3. Lay out and install starter piece
   4. Install additional pieces
   5. Break joints

B. Underlayment
   1. Safety
   2. Lay out and install starter sheet
   3. Install additional sheets

XIX. INTERIOR TRIM

A. Safety
B. Cased Opening
   1. Check rough opening
   2. Assemble jamb
   3. Install jamb
   4. Install casing
C. Window
   1. Safety
   2. Install stool
   3. Install apron
   4. Install casing
   5. Install stops
D. Baseboard
   1. Safety
   2. Install base
   3. Install base moulding
   4. Install shoe moulding
E. Closet
   1. Safety
   2. Install wood cleats/brackets
   3. Install closet shelving
   4. Install closet pole
F. Hinged Door Jamb
   1. Safety
   2. Check rough opening
   3. Assemble jamb
   4. Level head jamb
   5. Plumb, shim and fasten hinge jamb
   6. Install casings
   7. Fit door
   8. Install hinges-jamb/door
   9. Hang door
   10. Shim lock side to fit door
   11. Install lock set
   12. Install and adjust stops
   13. Install casings
G. Sliding and Folding Doors
   1. Safety
   2. Lay out and install track
   3. Fit door to opening
   4. Install hardware
   5. Insert and adjust door

H. Pre-Hung Doors
   1. Safety
   2. Check door opening for size
   3. Install unit in opening
   4. Plumb unit and nail
   5. Install shims
   6. Install casings
   7. Nail stops
   8. Check operation of door

I. Paneling
   1. Safety
   2. Lay out and install necessary blocking
   3. Lay out and cut first panel
   4. Cut holes for outlets
   5. Install panel

J. Ceiling Tile
   1. Safety
   2. Lay out spacings
   3. Install furrings
   4. Establish starting point
   5. Cut and install first tile

K. Suspended Ceiling
   1. Safety
   2. Lay out spacing
   3. Install wall mouldings
   4. Install main runners
   5. Install cross tees
   6. Install panels

XX. KITCHEN CABINETS

A. Safety

B. Base Unit
   1. Safety
   2. Platform
   3. Partitions
   4. Cleats
   5. Shelving
   6. Drawer slides
   7. Build drawers
   8. Make doors
   9. Apply plastic laminate
   10. Install hardware

C. Upper Wall Units
   1. Safety
   2. Soffit
   3. Ends
   4. Partitions
   5. Shelf cleats
   6. Face
   7. Make doors
   8. Apply plastic laminate
   9. Install hardware

D. Counters
   1. Safety
   2. Install wood counter
   3. Lay out and make cutouts
   4. Apply plastic laminates

XXI. CUSTOMER RELATIONS AND BUSINESS PRACTICES

A. Dress and Appearance-First Impressions
   1. Clothing
      a. neat
      b. clean
   2. Personal appearance
      a. cleanliness
      b. personal hygiene
      c. manners
         1. polite
         2. tactful

B. Courtesy to the Customer
   1. Telephone communication
      a. courteous
      b. sincere
      c. listen
      d. never argue but stand on facts
      e. misunderstanding produces ill will
   2. Association in person
      a. call customer by name
      b. pronounce name correctly
      c. efficient service
      d. brief, thorough
      e. satisfy complaints
      f. enthusiasm about company
      g. enthusiasm about product

C. Customer Psychology
   1. Get the customer's story
   2. Agreement precedes disagreement
   3. Knowledge of product
   4. Ignorance kills customer confidence
   5. Show initiative

D. Business Practices
   1. Maintain good records
      a. customer files
      b. service calls
      c. time spent
      d. parts used
      e. billings
      f. correspondence
      g. inventory
      h. service bulletins
      i. cost (all costs)
      j. taxes (all taxes)
      k. gross income
      l. net profit

E. Ethics
   1. Workmanship
   2. Parts cost
   3. Labor cost
   4. Overhead cost
   5. Promptness
   6. Contractual and implied obligations
   7. Customer consideration

## STUDENT PROGRESS RECORD

A major principle of vocational education is that students learn skills or the performance of operations of a trade with the production job as a vehicle to accomplish this objective.

The operations are defined on the shop progress record and it is imperative that the instructor have some means of recording the student experiences and achievement.

The approved method of recording student progress is as follows:

INSTRUCTED - This designation on the progress record indicates that the student has performed a skill with the assistance of and under the supervision of the instructor.

PRACTICED - This designation on the progress record indicates that the student has performed a skill with little help from the instructor.

PROFICIENT - This designation on the progress record indicates that the student is capable of performing a skill within a reasonable amount of time with no assistance from the instructor. In effect, this implies that the student has been tested for that skill.

This method of noting student progress will define accurately student achievement and, in fact, will point out any weaknesses the student may have in certain operations; thus highlighting areas where the student may need help.

Grades should be kept on student daily progress cards or in roll books.

Grade_____ Year_____ Instructor_____

| STUDENT | TOOL CHECK NO. | LOCKER NO. | TEXT BOOK NO. | SHOP GRADES MARKING PERIOD | | | | | | THEORY GRADES MARKING PERIOD | | | | | |
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I. FOUNDATIONS

| | Establish Building Lines | Erect Wall Footing Forms | Erect Pier and Column Forms | Erect Slab Type Forms | Erect Foundation Wall Forms | Erect Retaining Wall Forms | Erect Forms For Steps | Strip Wall Forms | Wall Preparation | Horizontal Shoring | Single Post Shoring | | | | | |
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II. FRAMING

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II. FRAMING (CONTINUED)

III. STAIR BUILDING

| | | |

IV. ROOF FRAMING

Layout Roof

Frame Gable Roof

Layout Intersecting Roofs

Frame Intersecting Roofs

Layout Hip Roof

Frame Hip Roof

Layout Trusses

Frame Trusses

V. ROOFING

Apply Composition Shingles

Apply Wood Shingles

Apply Asphalt Shingles

Apply Roll Roofing

VI. EXTERIOR FLASHINGS

| | Install Step & Continuous Flashing | Flash Around Chimney | Flash Hips and Valleys | Flash Around Dormers | Flash Around Doors and Windows | | | | | | | | | | | |
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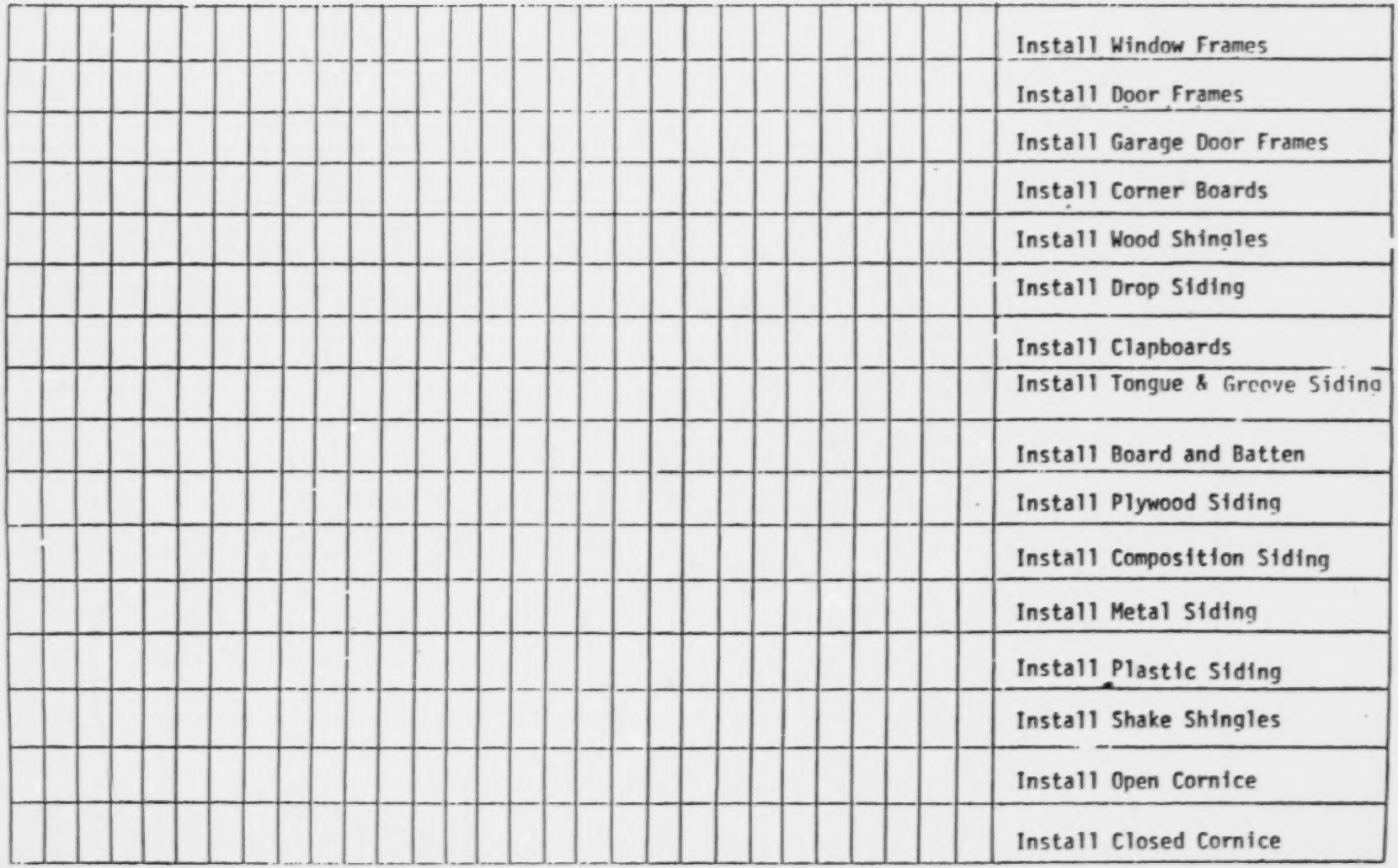
Install Window Frames
Install Door Frames
Install Garage Door Frames
Install Corner Boards
Install Wood Shingles
Install Drop Siding
Install Clapboards
Install Tongue & Groove Siding
Install Board and Batten
Install Plywood Siding
Install Composition Siding
Install Metal Siding
Install Plastic Siding
Install Shake Shingles
Install Open Cornice
Install Closed Cornice



47

VII. EXTERIOR TRIM (CONTINUED)

VIII. INTERIOR TRIM

| | Hang Wood Gutters | Hang Metal Gutters | Install Facia | Install Soffits | Install Rake Board | | | | | Install Finish Floorings | Trim Cased Openings | Install Window Trim | Install Base Boards | Trim Closets | Install Door Jambs | Fit & Hang Doors |
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VIII. INTERIOR TRIM (CONTINUED)

IX. KITCHEN CABINETS

| | Install Sliding & Folding Door | Install pre-hung Doors | Install Finished Hardware | Install Ceiling Tile | Hang Suspended Ceiling | Install Ceiling Mouldings | | | | Layout Base Unit | Layout Wall Unit | Layout Counters | Apply Plastic Laminates | Install Base Units | Install Wall Units | Install Counters |
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X. FASTENERS

XI. DRY WALL

| | Use Nails | Apply Adhesives | Assemble With Screws | Assemble With Bolts | Install Anchors | | Install Ceilings | Apply to Walls | Install Corner Beads | Taping | Mouldings | | | | | |
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XII. INSULATION

XIII. PORTABLE POWER TOOLS

| | Install Blankets | Install Batts | Apply Loose Insulation | Install Building Boards | | | | Route/Shapes | Trim Veneer | Plane Surfaces | Sand Surfaces | Cut to Lines | Cut Irregular Shapes | Staple | Drill Holes | Use Fastening Devices |
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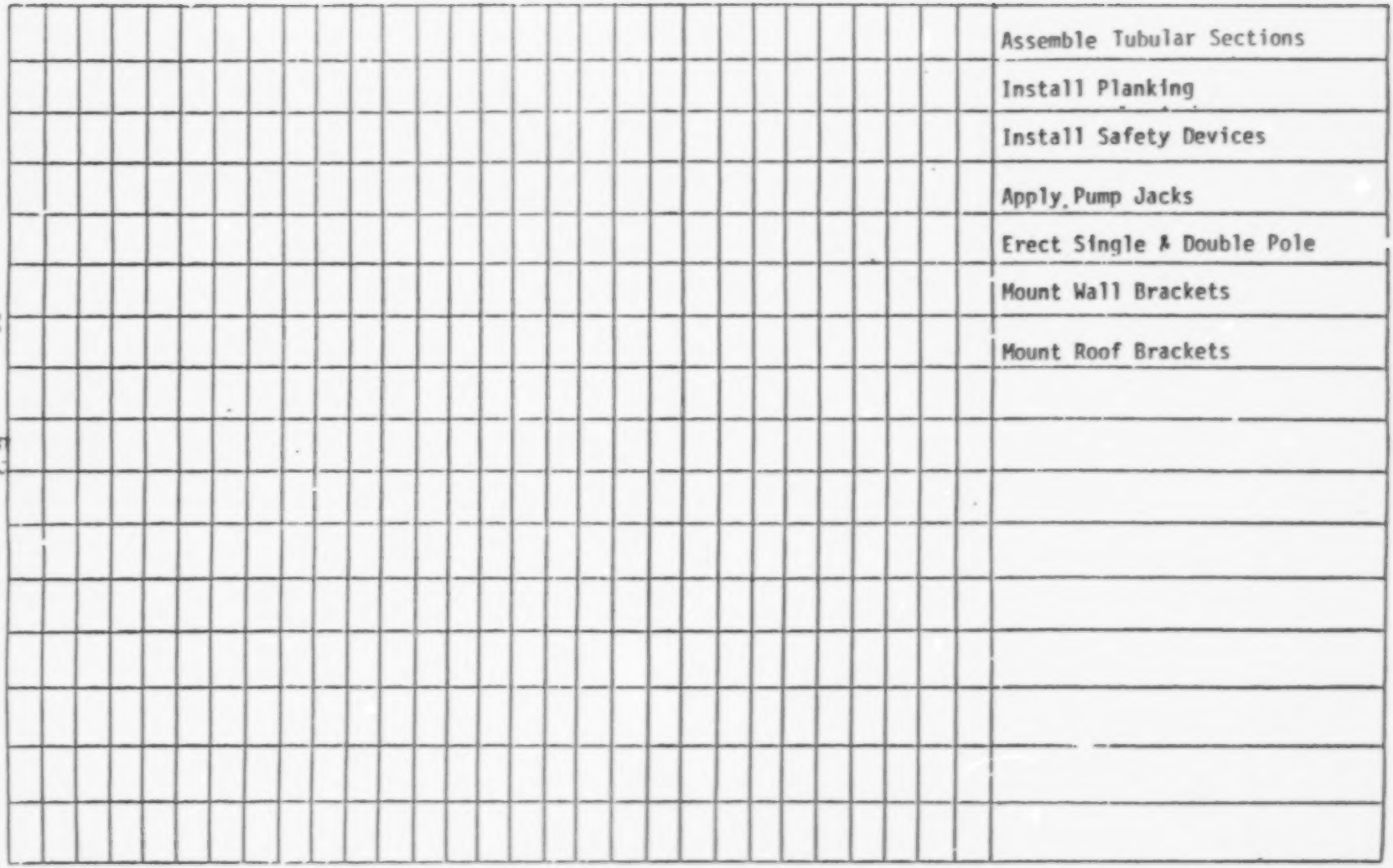
XIV. STATIONARY MACHINES

| | |
|---|---|
| | Perform Plane Surfaces Operations |
| | Perform Jointer Operations |
| | Saw to Lines |
| | Perform Radial Saw Operations |
| | Perform Panel Saw Operations |
| | Perform Band Saw & Operations |
| | Perform Scroll Saw Operations |
| | Perform Mortiser Operations |
| | Perform Horizontal Borer |
| | Perform Lathe Operations |
| | Perform Shaper Operations |
| | Perform Tool Grinder Operations |
| | Perform Drill Press Operations |
| | Perform Belt & Disc Sander Operations |
| | Perform Miter Box Operations |
| | _____ |

XV. STAGINGS


Assemble Tubular Sections
Install Planking
Install Safety Devices
Apply Pump Jacks
Erect Single & Double Pole
Mount Wall Brackets
Mount Roof Brackets

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# CARPENTRY APPRENTICE RELATED CURRICULUM

PREPARED BY EASTCONN
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PREPARED FOR:

CONNECTICUT STATE DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION
VOCATIONAL-TECHNICAL SCHOOL SYSTEM
MIDDLETOWN, CONNECTICUT

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ALL OPINIONS EXPRESSED REFLECT THE VIEWS OF THE AUTHORS AND ARE NOT
NECESSARILY THOSE OF THE CONNECTICUT STATE DEPARTMENT OF EDUCATION

1989

## 05: Carpentry

### Apprentice Related Curriculum

First Year

1. A0001 Trade Mathematics
2. A0401 Carpentry Theory I
3. A0402 Carpentry Theory II
4. A0031 Building Trades BPR

Second Year

1. A0002 Trade Mathematics
2. A0403 Carpentry Theory III
3. A0033 Building Trades BPR
4. A0404 Carpentry Theory IV

Third Year

1. A0405 Carpentry Theory V
2. A0406 Carpentry Theory VI
3. A0407 Carpentry Theory VII
4. A0408 Carpentry Theory VIII

Fourth Year

1. A0413 Carpentry Theory XIII: Commercial Construction
2. A0016 Trade Mathematics: Carpentry
3. A0055 Commercial Blueprint Reading and Estimating
4. A0414 Carpentry Theory XIV: Leveling Instruments

## GENERAL DESCRIPTION OF CARPENTRY TRADE

### Apprentice Component

Carpentry is not a licensed trade; an individual may register at their town or city hall, pay the fee and they do carpentry work. Any individual may become an apprentice by signing a contract with an employer willing to hire him or her as an apprentice. They then validate this contract by signing with the Labor Department which becomes responsible for overseeing both parties until the agreement is fulfilled. The carpentry trade requires a period of training of 8,000 hours which takes about four years. The apprentice absorbs his/her practical training on the job, developing the necessary skills, learning about the mechanics of the trade, working with hand tools, and supplementing this "how to" practical experience with the theory provided by the related training component.

### Related Component

The related training is provided in the classrooms and shops of the Regional Vocational-Technical School System by lectures, discussions, use of models, visual aids, lab experiments, assignments, examinations and through the use of the vocational school equipment. The carpentry-related portion also requires 8,000 hours: 16 units of instruction with one unit representing 36 hours of instruction, usually completed in 12 three-hour sessions. The objective of the program is to meet the requirements for achieving journeyman status and meeting the company's exact apprentice training requirements. Upon completion of their related and "on-the-job" training, they are eligible to take the State of Connecticut Journeyman Carpenter's License when the exam is passed. The apprentice and related component must be completed within the four years.

# A0001 - TRADE MATHEMATICS

LENGTH: 36 Hours

DESCRIPTION: This course will enable students to solve problems involving angles, areas, weights, measures, rectangles, triangles, and volumes through the English and metric systems as these problems apply to the trade of their choice. It will also provide a review of basic arithmetic operations.

COMPETENCIES: The student will:

- o solve problems with an accuracy of no less than seventy percent (70%)
- o demonstrate basic mathematic operations
- o apply English and metric systems to a variety of problems found in their trade.

I. Basic Operations - Review

A. Real numbers
   1. addition
   2. multiplication
   3. subtraction
   4. division

B. Fractions and decimal fractions
   1. addition
   2. subtraction
   3. multiplication
   4. division
   5. conversion from fractions to decimals

C. Percentages and ratios
   1. theory and percentage
   2. computation of average
   3. computation of interest rates
   4. ratio and proportion

D. Roots and squares
   1. of whole numbers
   2. of decimals
   3. of fractions
   4. use of handbook tables in terms of roots

II. Areas

A. Squares and rectangles
B. Triangles and irregular figures

III. Volumes

A. Cubes and rectangles
B. Cylinders
C. Irregular shapes

IV. Charts and Graphs

A. Types of graphs:
   1. bar
   2. linear
   3. circular
   4. interpreting graphs and charts from handbooks

V. Metric System

A. Conversion from English to metric system
   1. linear measure
   2. square measure
   3. cubic measure

TEXTBOOKS: Refresher Math. Edwin I. Stein, Allyn and Bacon, Inc., 1984.
Applied General Mathematics. Robert D. Smith, Delmar Pub. Inc., 1984.

RESOURCES: Chalkboard lectures
Problems - worksheets
Homework - assignments
Tests
Trade applications
Flash cards

A0401 - Carpentry Theory I

LENGTH: 36 Hours

DESCRIPTION: To acquaint the student with the knowledge, description and use of tools most commonly used by the carpenter and a good working knowledge of lumber.

COMPETENCIES: The apprentice will be able to:

- o identify and describe the hand tools commonly used
- o tell how and why each tool is used
- o safely use the required power tools
- o state the sizes and grades of lumber.

I. Safety

A. Clothing
B. Personal protective equipment
C. Hand tools
D. Power tools
E. Good housekeeping
F. Decks and floors
G. Excavations
H. Scaffolds and ladders
I. Falling objects
J. Lifting and carrying
K. Fire protection
L. First aid

II. Power Tools

A. Safety
B. Portable circular saws
C. Saber saws
D. Portable electric drills
E. Power planes
F. Portable routers
G. Portable sanders
H. Staples and nailers
I. Radial arm saws
J. Table saws and jointers
K. Power tool care and maintenance

III. Leveling Instruments

A. Types
B. Care of leveling instruments
C. Setting up instruments
D. Sighting
E. Leveling
F. Horizontal angles
G. Contour lines
H. Running straight lines with transit
I. Vertical planes and lines

IV. Building Materials

A. Wood structure and growth
B. Kinds of wood
C. Cutting method
D. Moisture content and shrinkage
E. Equilibrium moisture content
F. Seasoning lumber
G. Moisture meters
H. Lumber defects
I. Grades
   1. soft woods
   2. hard woods
J. Stress grades lumber
K. Lumber sizes
L. Figuring board footage
M. Plywood
N. Plywood grades
   1. soft woods
   2. hard woods
O. Wood identification
P. Hard board
Q. Wood treatments
R. Non-wood material
S. Handling and storing
T. Metal fasteners
U. Adhesives
V. Mastics

V. Scaffolds and Ladders

A. Types of scaffolding
B. Manufactured scaffolding
C. Brackets, jacks and trestles, ladders

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishers Inc., 1984.
Framing, Sheathing and Insulation. Jones and Ball, Delmar Publishers Inc., 1973.

RESOURCES: Visual aids: Photos, film
Demonstration of all tools available - Lab
Hands-on use of tools - lab
Demonstration of power tools - lab

A0402 - CARPENTRY THEORY II

LENGTH: 36 Hours

DESCRIPTION: To provide the student with a knowledge of standards and practices in concrete work, dealing with footings and foundations.

COMPETENCIES: The student will be able to:

- o construct forms for footings and foundations
- o build and install girders, erect columns, and lay sills
- o lay out and install floor joists.

I. Safety

A. Clothing
B. Personal protective equipment
C. Hand tools
D. Power tools
E. Good housekeeping
F. Decks and floors
G. Excavations
H. Scaffolds and ladders
I. Falling objects
J. Lifting and carrying
K. Fire protection
L. First aid

II. Footings and Foundations

A. Laying out building lines
B. Batter boards
C. Excavation
D. Footing design
E. Forms for footings
F. Concrete
G. Cement
H. Aggregates
I. Wall forms
J. Form ties
K. Panel forms
L. Windows and doors
M. Lintels
N. Placing concrete
O. Anchor bolts
P. Concrete block foundations
Q. Size and shapes

III. Floor Framing

A. Types of framing
   1. platform framing
   2. balloon framing
B. Girders and beams

C. Posts and columns
D. Framing over girders and beams
E. Sill construction
F. Installing sills
G. Joists
H. Laying out joists
I. Installing joists
J. Framing openings
K. Bridging
L. Special framing problems
M. Low-profile floor frames
N. Subfloors
O. Plywood
P. Fiberboard
Q. Estimating materials
R. Insulating foundation walls and floors
S. Waterproofing
T. Backfilling
U. Slab on ground construction
V. Basement floors
W. Entrance platforms and steps
X. Sidewalks and drives
Y. Estimating materials

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishers Inc., 1984.
Framing, Sheathing and Insulation. Jones and Ball, Delmar Publishers Inc., 1973.

RESOURCES: Photos of construction (footings, foundations, flooring)
Building models of platform, balloon and plank and beam framing in workshop - Lab
Complete sub-floor models with 1/4" lathe (includes floor joists, girders and cross-bridging) in workshop - Lab

## A0031 - BUILDING TRADES BLUEPRINT READING

LENGTH: 36 Hours

DESCRIPTION: Provide the apprentice with the ability to interpret orthographic projections, isometric and detail drawings.

COMPETENCIES: The student will be able to:

- o apply above skills to problems associated with their trade
- o read and interpret blueprints
- o perform above skills with an accuracy of no less than 70%.

I. Reading Drawings

A. Pictorial drawings
B. Perspective drawings
C. Isometric drawings
D. Oblique drawings
E. Three-view drawings

II. Reading Elevation Drawings

A. Design of building
B. The roof
C. Openings
D. Dimensions
E. Exterior finish
    1. materials
    2. trim
F. Miscellaneous details

III. Reading Floor Plans

A. Importance
B. Basic ideas in reading plans
C. Reading floor plans
    1. one-story house
    2. two-story house
    3. one-and-one-half-story house

IV. Symbols and Notations

A. Materials
B. Building parts

V. Scaling and Dimensional Practices

A. The architect's scale
B. Reading a scale
C. Measuring blueprints
D. Drawing symbols or conventions to scale
E. Dimensioning standards
    1. exterior walls
    2. interior partitions
F. Dimensioning methods
G. Windows and doors

VI. Reading Blueprints for Structural Information

A. Construction types
B. Platform framing
C. Balloon framing
D. Plank and beam framing
E. Brick veneer construction
F. Masonry buildings
G. Unit construction
H. Prefabricated houses

VII. Reading Detail Drawings

A. Dimensions
B. Locating detail
C. Details of interior wall elevations
D. Details of the structure
E. Window and door details
F. Details of trim
    1. exterior
    2. interior

VIII. Reading Blueprints for Trade Information

A. Types of trade information
B. Division of labor
C. Specifications
D. Modular and component concepts
E. Electrical work
F. Plumbing
G. Sheet metal
H. Heat and air conditioning
I. Concrete work and masonry
J. Welding

TEXTBOOKS: Building Trades Blueprint Reading, 5th Edition, Part 1 Fundamentals. E.W. Sundberg, American Technical Publishers Inc., 1987.
Basic Construction Blueprint Reading. Mark W. Huth, Delmar Publishers Inc., 1989.

RESOURCES: Chalkboard lectures
Scaling and dimensional practice
Reading actual blueprints
Testing

# A0002 - TRADE MATHEMATICS

LENGTH: 36 Hours

DESCRIPTION: This course will provide the student with the necessary skills to perform addition, subtraction, multiplication and addition of algebraic functions including fractions and the application of these techniques to the transposition of formulas and the solution of trade problems. The student will perform these skills with an accuracy of no less than seventy percent (70%).

COMPETENCIES: The student will be able to:

- o solve algebraic equations
- o transpose equations used in their trade
- o solve word problems.

I. Formulas

A. Transposition of simple formulas
   1. balancing the formula
B. Application of formulas to problems

II. Algebraic Fundamentals

A. Concepts
   1. positive and negative numbers
   2. addition, multiplication and division of Algebraic expressions

III. Equations

A. One unknown
   1. solutions through addition, subtraction, multiplication and division
B. Exponents
   1. solutions through addition, multiplication, subtraction and division of exponents
C. Factoring
   1. complete factoring of polynomials
   2. difference of two squares
   3. general method

TEXTBOOKS: Algebra in Easy Steps. Edwin I. Stein, Allyn and Bacon, Inc., 1982.

RESOURCES: Chalkboard lectures
Assignments
Testing
Worksheet problems

A0403 - CARPENTRY THEORY III

LENGTH: 36 Hours

DESCRIPTION: To provide the student with information on the various types and methods of framing used, as related to design, location, material and other special requirements.

COMPETENCIES: The student will be able to:

- o construct and erect wall sections to form the exterior wall frame
- o lay out, cut and install ceiling joists
- o lay out a common rafter and erect an equal-pitched gable and shed roofs.

I. Safety

A. Clothing
B. Personal protective equipment
C. Hand tools
D. Power tools
E. Good housekeeping
F. Decks and floors
G. Excavations
H. Scaffolds and ladders
I. Falling objects
J. Lifting and carrying
K. Fire protection
L. First aid

II. Wall and Ceiling Framing

A. Parts of the wall frame
   1. corners
   2. partition
   3. rough openings
B. Plate layout
   1. master stud layout
C. Constructing wall sections
D. Erecting wall sections
E. Partitions
F. Bracing
G. Double plate
H. Special problems
I. Wall sheathing
J. Ceiling framing
K. Estimating materials

III. Roof Framing

A. Roof types
B. Parts for roof types
C. Parts of a rafter

D. Layout terms and principles
E. Slope and pitch
F. Unit measurements
G. Framing plans
H. Size of material
I. Laying out common rafters
J. Using the rafter table
K. Erecting a gable roof
L. Gable and frame
M. Hip and valley rafters
N. Jack rafters
O. Erecting jack rafters
P. Roof openings
Q. Roof anchorage
R. Collar beams
S. Dormers
T. Flat roofs
U. Gambrel roof
V. Roof truss construction
W. Roof sheathing
X. Model construction (shop)

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishers Inc., 1984.
Framing, Sheathing and Insulation. Jones and Ball, Delmar Publishers Inc., 1973.

RESOURCES: Available audio-visual aids
Complete wall and ceiling sections and add the choren roof framing for your model in workshop - Lab
Chalkboard lecture

## A0033 - BUILDING TRADES BLUEPRINT READING

LENGTH: 36 Hours

DESCRIPTION: To course is designed to meet the needs of the Building Trades and provide the student with the skills to read blueprints and estimate materials. It also provides the student with the skills to make working drawings from building plans and specifications.

COMPETENCIES: The student will be able to:

- o construct working drawings from specifications
- o recognize and identify symbols of all other building trades involved on construction site
- o interpret elevations, plot plans, floor plans and dimensioning.

I. Residential

A. General information and specifications
   1. dimensions
   2. scale
   3. elevation
   4. plan views
      a. plot
      b. basement
      c. floor
   5. schedules

B. Commercial building
   1. structure
      a. steel framework
      b. reinforce concrete slab
      c. masonry construction
      d. frame construction
      e. light steel construction

C. Estimating
   1. concrete
   2. framing
   3. masonry
   4. wet and dry walls
   5. special interior covering
   6. paints
   7. windows, doors
   8. hardware
   9. electric wiring
   10. plumbing
   11. sheet metal
   12. heating and air conditioning
   13. labor
   14. other millwork and paneling

TEXTBOOKS: Building Trades Print Reading - Part 2, Residential and Light Commercial Construction. Sundberg and Proctor, American Technical Publishers, 1985.

RESOURCES: Chalkboard lectures
Reading of residential and commercial plans
Homework assignment utilizing branch bank prints (5) included in text package
Testing

AO404 - CARPENTRY THEORY IV

LENGTH: 36 Hours

DESCRIPTION: To provide the student with a knowledge of the principles involved and a thorough understanding of the layouts and procedures used in roof framing and materials.

COMPETENCIES: The student will be able to:

- o describe kinds of roofing felt, asphalt shingles and roll roofing and apply them
- o flash valleys, sidewalls, chimneys and other obstructions
- o describe several energy and material conservation framing methods.

I. Safety

A. Clothing
B. Personal protective equipment
C. Hand tools
D. Power tools
E. Good housekeeping
F. Decks and floors
G. Excavations
H. Scaffolds and ladders
I. Falling objects
J. Lifting and carrying
K. Fire protection
L. First aid

II. Roofing Materials

A. Types of materials
B. Roofing terms
C. Preparing the roof deck
D. Asphalt roofing materials
E. Underlayment
F. Drip edge
G. Flashing
    1. eaves
    2. valleys
    3. walls
    4. chimney
    5. vent stack
H. Applying shingles
    1. nailing and fastening
    2. first and succeeding courses
    3. starter strip
    4. hexagonal shingles
    5. hips and ridges

6. wind protection
7. low slope roofs
8. built-up roofings
9. wood shingles
10. sheathing
11. underlayment
12. special effects

I. Mineral fiber shingles
1. application
2. flashing
3. re-roofing over old shingles

J. Tile roofing

K. Galvanized sheet metal roofing
1. slope and laps
2. sheathing and nails

L. Aluminum roofing

M. Terne metal roofing

N. Gutters
1. wood gutters
2. metal gutters

O. Estimating material

III. Post and Beam Construction

A. Posts
B. Floor beams
C. Beam descriptions
D, Roof beams
E. Fasteners
F. Partitions
G. Planks
H. Stressed skin panels
I. Box beams
J. Laminated beams and arches
K. Types of arches

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishers Inc., 1984.
Framing, Sheathing and Insulation. Jones and Ball, Delmar Publishers Inc., 1973.

RESOURCES: Chalkboard lecture
Audio visual aids
1. films
2. slides
3. photos
Demonstrate roofing techniques on a 4' x 8" sheet of plywood - Lab

## A0405 - CARPENTRY THEORY V

LENGTH: 36 Hours

DESCRIPTION: To provide the student with a knowledge of windows; exterior doors, exterior finish, insulation and the study of materials and methods used for covering interior framed areas.

COMPETENCIES: The student will be able to:

- o install various types of windows in an approved manner
- o name the parts of, build and set an exterior door frame
- o describe the shapes, sizes and grades of various exterior wall siding products and their installation.

I. Safety

- A. Clothing
- B. Personal protective equipment
- C. Hand tools
- D. Power tools
- E. Good housekeeping
- F. Decks and floors
- G. Excavations
- H. Scaffolds and ladders
- I. Falling objects
- J. Lifting and carrying
- K. Fire protection
- L. First aid

II. Windows

- A. Manufacturing standards
- B. Types of windows
- C. Window heights
- D. Window glass
- E. Insulating windows
- F. Screens
- G. Mullions
- H. Parts of windows
- I. Windows in plans and elevation
- J. Window sizes
- K. Jamb extensions
- L. Story poles
- M. Installing windows

III. Exterior Doors

- A. Types
- B. Installing door frames
- C. Sizes
- D. Garage doors
- E. Garage door frames
- F. Hardwood

IV. Exterior Wall Finish

A. Cornice designs
B. Parts of cornice and rake section
C. Cornice and rake construction
D. Prefabricated cornice materials
E. Wall finish
    1. types
F. Nailing
G. Blinds and shutters

V. Thermal and Sound Insulation

A. How heat is transmitted
B. Thermal insulation
C. Heat loss coefficients
D. How much insulation
E. Types of insulation
F. Where to insulate
G. Condensation
H. Vapor barriers
I. Ventilation
J. Installation
K. Acoustic and sound control
L. Terms
M. Sound intensity
N. Transmission
O. Wall construction
P. Floor and ceilings
Q. Noise reduction within a space
R. How acoustical materials work
S. Suspended ceilings
T. Acoustical plaster
U. Installation of materials
V. Maintenance

VI. Interior Wall and Ceiling Finish

A. Plaster
B. Plaster bag
C. Applying lath
D. Metal lath
E. Reinforcing
F. Plaster grounds
G. Plaster base on masonry walls
H. Plastering materials and methods
I. Veneer plaster
J. Gypsum wallboard
K. Single layer construction
L. Measuring and cutting
M. Nails and screws
N. Adhesive
O. Joint and fastener concealment

P. Corners
Q. Double layer construction
R. Redecorated wallboard
S. Masonry walls
T. Waterproofing gypsum wallboard
U. Solid lumber paneling
V. Plywood
W. Hardboard
X. Plastic laminates
Y. Ceiling tile
    1. layout procedure
    2. installing furring
    3. installing tile
    4. suspended ceilings

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishers Inc., 1984.
Framing, Sheathing and Insulation. Jones and Ball, Delmar Publishers Inc., 1973.

RESOURCES: Chalkboard lecture
Audio visual aids
    1. films
    2. slides
    3. photos
    4. magazines, etc.
Distribute catalogs (windows, wall and ceiling finish) and review contents
Testing

A0406 - CARPENTRY THEORY VI

LENGTH: 36 Hours

DESCRIPTION: To provide the student with information necessary to install flooring, stair construction, doors and interior trim, cabinet making, post and beam construction and scaffolds.

COMPETENCIES: The student will be able to:

- o lay out and frame a stairway with a landing
- o hang a swinging interior door
- o describe the kinds, sizes and grades of hardwood flooring
- o plan, order and install factory built kitchen cabinets.

I. Safety

A. Clothing
B. Personal protective equipment
C. Hand tools
D. Power tools
E. Good housekeeping
F. Decks and floors
G. Excavations
H. Scaffolds and ladders
I. Falling objects
J. Lifting and carrying
K. Fire protection
L. First aid

II. Finish Flooring

A. Terms
B. Wood flooring
C. Types of wood flooring
D. Sizes and grades
E. Subfloors
F. Installing wood strip floor
G. Nailing
H. Laying around projections
I. Multi-room layout
J. Wood flooring over concrete
K. Wood block flooring
L. Pre-finished wood flooring
M. Underlayment
N. Hardboard
O. Plywood
P. Installing resilient floor tile
Q. Spreading adhesive
R. Laying tile

III. Stair Construction

A. Types of stairs
B. Parts and terms
C. Stairwell framing
D. Stair design
E. Stair calculations
F. Stair length
G. Stringer layout
H. Treads and risers
I. Types of stringers
J. Using stock stair parts

IV. Doors and Interior Trim

A. Moldings
B. Interior door frames
C. Installing door frames
D. Door casing
E. Types of doors
F. Sizes and grades
G. Door installation
H. Installing hinges
I. Door stops
J. Door locks
K. Lock installation
L. Thresholds and door bottoms
M. Prehung door unit
N. Sliding doors (pocket type)
O. Sliding doors (by-pass type)
P. Folding doors
Q. Window trim
R. Baseboard and base shoe
S. How moldings are produced

V. Cabinet Making

A. Drawings for cabinet work
B. Standard sizes
C. Construction procedure
D. Master layout
E. Basic framing
F. Facing
G. Drawer guides
H. Drawers
I. Shelves
J. Doors
K. Sliding doors
L. Counter and tops
M. Cabinet hardware
N. Other built-in units
O. Sequence of inter-finish
P. Factory-built cabinets

78

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishers Inc., 1984.
Framing, Sheathing and Insulation. Jones and Ball, Delmar Publishers Inc., 1973.

RESOURCES: Chalkboard lecture
Available visual aids:
video tapes
slides
photos
Lab: demonstrate installing oak flooring on a plywood platform
Lab: build a model of a stair section using math calculations
Lab: hang a door properly

AO407 - CARPENTRY THEORY VII

LENGTH: 36 Hours

DESCRIPTION: To provide the student with the knowledge of estimating as related to the building trades.

COMPETENCIES: The student will be able to:

- o calculate cost and material needs for a small house exterior and interior
- o calculate amount of concrete needed for the foundation
- o calculate hardware needs for small house.

I. Estimating for the Building Trades - Exterior

- A. Estimating and the estimator
- B. Plan reading
- C. Specifications
- D. Review of square and cubic measure
- E. Surveying and excavation
- F. Concrete
- G. Framing I
  1. walls
  2. floors
- H. Framing II
  1. structural openings
  2. roofs
  3. details

II. Estimating for Building Materials

- A. Masonry
- B. Wet and dry walls
- C. Special interior coverings
- D. Paints
- E. Glass and acrylic
- F. Window coverings
- G. Hardware

TEXTBOOKS: Practical Problems in Mathematics for Carpenter, 4th Edition. Harry C. Huth, Delmar Publishing Inc., 1985.
Carpentry. Gaspar J. Lewis, Delmar Publishing Inc., 1984.

RESOURCES: Chalkboard calculations
Blueprints of small house (4 rooms)

## A0408 - CARPENTRY THEORY VIII

LENGTH: 36 Hours

DESCRIPTION: To provide the student with welding as it applies to carpentry.

COMPETENCIES: The student will be able to:

- o run beads with a welding rod
- o join two pieces of metal by the fusion process
- o braze and/or silver solder metals.

I. Welding and Fabricating

- A. Thermoplastic
- B. Steel
  1. Storing and handling
  2. Tools, equipment and machinery
  3. Layout, cutting and machining
  4. Welding
  5. Pipe
  6. Fabrication
  7. Standard products
  8. Terms

II. Oxyacetylene Welding

- A. Cylinders
  1. oxygen
  2. acetylene
- B. Welding torches
- C. Welding tips
- D. The welding flame
- E. Equipment set-up
- F. Lighting the torch
- G. Flame cutting of steel

III. Applications

- A. Welding symbols
  1. describing welds on drawings
- B. Running beads
- C. Making beads with welding rod
- D. Brazing cast iron
- E. Silver soldering
  1. nonferrous metals
  2. ferrous metals

TEXTBOOK: Basic Oxyacetylene Welding - 4th Edition. Griffin, Roden, Charles W. Briggs, Delmar Publishers Inc., 1984.

RESOURCES: Photographs of weld
Weld samples
Chalkboard lectures
Welding shop "hands-on" practice; running beads, brazing, silver soldering, etc.
Demonstrations

## A0413 - COMMERCIAL CONSTRUCTION

LENGTH: 36 Hours

DESCRIPTION: To provide the student with a knowledge of the types of commercial construction, the material used, specifications for materials, forming details, erection procedures and hardware used in erection.

COMPETENCIES: The student will be able to:

- o understand the complex requirements of multifamily residential and light commercial construction
- o understand construction techniques
- o understand the importance of regional differences.

I. Concrete

A. History of cement and concrete
B. Specifications for concrete
C. Aggregates
D. Sampling and testing concrete
E. Concrete and mixtures
F. Methods of concrete placement
G. Moving concrete on the job
H. Finishing a concrete slab
I. Curing concrete
J. Reinforced concrete

II. Forming Details, Construction and Erection

A. Foundations
B. Columns
C. Wall forms
D. Beam girders and floor system
E. Slipforms
F. Concrete anchors and inserts
G. Bulkheads and screeds
H. Joints in concrete
I. Ramps and runways

III. Structural Steel Construction

A. The development of steel structures
B. Types of steel-framed buildings
C. Industrial-type buildings
D. Multi-story buildings
E. Characteristics structural metals
F. Fasteners
G. Welding
H. Fireproofing

IV. Heavy Timber Construction

A. Uses of heavy timber
B. Wood for heavy timber construction
C. Layout principles and design
D. Tools and fasteners
E. Erection
F. Post and beam construction
G. Roof trusses and arches
H. Glued laminated construction
I. Trestles, decks and bridges
J. Tunnels, tanks, towers and foundation timbering
K. Waterfront structures
L. Dams, retaining walls and pole type and log construction

TEXTBOOKS: Carpentry. Gaspar J. Lewis, Delmar Publishing Inc., 1984.
Building Trades Printreading, Part 2, Residential and Light Commercial Construction. Sundberg and Proctor, American Technical Publishers, 1985.

RESOURCES: Chalkboard lectures
Use of models
Visual Aids:
1. video tapes
2. photos
3. magazines, catalogs
Assignments
Testing

## A0016 - TRADE MATHEMATICS: CARPENTRY

LENGTH: 36 Hours

DESCRIPTION: To provide the student with the skills required to compute time sheets and material lists for job operations. To provide the student with a knowledge of differing types of estimating used in commercial building - also a review of math, both in English and metric including conversion of standard sizes to metric dimensions.

COMPETENCIES: The student will be able to:

- o solve problems with an accuracy of no less than 70%
- o keep accurate job records
- o apply English and metric conversion when needed.

I. Types of Estimating

- A. Area or volume method
- B. Guess estimate
- C. Detailed quantity take-off
- D. Unit cost estimate

II. Job Records

- A. Time sheets
- B. Record books
- C. Job time record for all trades

III. Material

- A. Estimating list
- B. Material list
- C. Inventory list

IV. Review of Math

- A. Formulas
- B. Formulas lateral area
- C. Formulas total area
- D. Volume of prisms
- E. Volume of a cylinder
- F. Volume of a pyramid
- G. Volume of a cone
- H. Volume of a sphere
- I. Metric conversion
- J. Changes in standard spacing and lumber sizes

TEXTBOOKS: Practical Problems in Mathematics for Carpenters, 4th Edition.
Harry C. Huth, Delmar Publishers Inc., 1984.

RESOURCES: Chalkboard calculations/lecture
Worksheets with problems
Homework assignments
Testing

## A0055 - COMMERCIAL BLUEPRINT READING AND ESTIMATING

LENGTH: 36 Hours

DESCRIPTION: To provide the student with a knowledge of Blueprint Reading specifications as they apply to commercial building, methods used in estimating labor and materials, and responsibility of safety.

COMPETENCIES: The student will be able to:

- o calculate total man hours for labor costs
- o calculate material costs (commercial)
- o know and identify construction terms and symbols.

I. Types of Commercial Construction

- A. Reinforced concrete
- B. Structural steel
- C. Heavy timber

II. Coordination of Prints and Specifications

- A. Scales used in drawings
- B. Working drawings
- C. Sections
- D. Details
- E. Shop drawings
- F. Specifications
- G. Conventions and schedules
- H. Glossary of construction terms
- I. Metric conversation
- J. Responsibility of safety

III. Estimating Labor

- A. Man hours for site work
- B. Man hours for concrete forms
- C. Man hours for trim

IV. Estimating Material

- A. Girders and sills
- B. Floor joists and bridging
- C. Rough flooring and wall plates
- D. Studding and fire or draft stops
- E. Rafters
- F. Sheathing
- G. Trim on doors and windows
- H. Roofing and siding
- I. Stairs and interior door jambs
- J. Finish flooring and paper
- K. Hardware and supplies

V. Responsibility of Safety

A. Management's responsibility
B. Personal protective equipment
C. Fire prevention
D. Sanitation
E. Barricades
F. Excavations
G. Shoring
H. Construction equipment
I. Scaffolds
J. Tools
L. Demolition

TEXTBOOKS: Building Trades Printreading - Part 2, Residential and Light Commercial Construction. Sundberg and Proctor; American Technical Publishers, 1985.
Practical Problems in Mathematics for Carpenters. Harry C. Huth, 4th Edition; Delmar Publishers Inc., 1985.
Carpentry. Gaspar J. Lewis, Delmar Publishing Inc., 1984.

RESOURCES: Chalkboard lecture
Visual aids: Video tapes, photos
Commercial blueprints
Assignments
Testing

## A0414 - LEVELING INSTRUMENTS

LENGTH: 36 Hours

DESCRIPTION: To provide the student with advanced knowledge of leveling instruments, measurement of a circle, setting up of an instrument, shooting angles, elevations, vertical plumbing and the uses of the laser.

COMPETENCIES: The student will be able to:

- o set up and use a transit level
- o properly use a line level and builder's level
- o display a knowledge of a variety of leveling instruments.

I. Types of Leveling Instruments

- A. Line level
- B. Builders level
- C. Level transit
- D. Laser

II. Measurements of a Circle

- A. Degrees
- B. Minutes
- C. Seconds
- D. Quadrant
- E. Arc

III. Parts of a Level and Setting Up

- A. Tripod
- B. Leveling base plate
- C. Leveling screws
- D. Clamp screw
- E. Index
- F. Horizontal circle
- G. Telescope
- H. Spirit level
- I. Setting up
- J. Leveling
- K. Sighting
- L. Reading the circle scale and the vernier

IV. The Laser

- A. Setting up
- B. Power supply
- C. The beam
- D. Elevations
- E. Plumbing

89

V. Uses of the Transit Level

A. Leveling rods and targets
B. Signals
C. Determining elevations
D. Laying out building lines
E. Running lines
F. Plumbing walls and columns
G. Measuring vertical angles
H. Compass direction

VI. Field Exercises using the Transit

TEXTBOOKS: Carpentry. Gaspar J. Lewis; Delmar Publishing Inc., 1984.
Fundamentals of Carpentry 2, 5th Edition. W.E. Durbahn, American Technical Publishers Inc., 1977.

RESOURCES: Chalkboard lectures
Visual aids: video tapes
1. types of leveling instruments
Lab: set up transit and determine elevations, demonstrate proper use of transit
Assignments
Testing